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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,009	09/30/2003	John E. Dolan	SLA1195	7266

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EXAMINER	
GE, YUZHEN	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/677,009	DOLAN ET AL.	
	Examiner	Art Unit	
	Yuzhen Ge	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *14* is/are allowed.

6)☒ Claim(s) *1,2 and 4-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 June 2007* is/are: a)☒ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Examiner's Remark

Applicant's amendment, filed on June 15, 2007, has been received and entered into the file. The objections to drawings and claims 9-10 and 101 rejection of claim 13 have been overcome in view of applicant's amendments/remarks and are hereby withdrawn. Claim 3 is canceled and claim 14 is new. Claims 1-2 and 4-14 are pending.

Regarding applicant's argument that Finlayson et al do not teach the element of "fitting a surface to said plurality of match scores, said surface representing illuminant values other than said candidate illuminants" nor "determining a point on said surface, said point corresponding to the data representing a likely illuminant for said image", the examiner disagrees. As explained in the rejection, the likelihood function is a surface and this surface is formed according to the probability or match score that the illuminant is a certain illuminant other than the candidate illuminant (right column of Page 1213 and left column of Page 1214). Furthermore, Finlayson et al also teach determine a point on that surface (left column of Page 1214, the point corresponding to the maximum is the point and this point is on the surface and it maximizes L(E|Cim), note that the candidate illuminants is a finite set and the surface has infinite number of points thus the surface represents illuminant other than the candidate illuminants).

Regarding applicant's argument that Finlayson et al do not teach the surface, they cannot teach solving for an extremum thereon, the examiner disagrees. Again, the maximum of the surface formed for the likelihood function L(E|Cim) is determined and solved (left column of Page 1214) and therefore an extremum is solved.

Regarding applicant's argument that Brainard et al do not teach fitting a surface to match scores or using that surface to determine a point corresponding to likely illuminant, the examiner

disagrees. The rejections clearly show where in the reference by Brainard et al show these features.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., a surface is a mathematical construct that spans between illuminant values, hence the surface represents illuminants other than candidate illuminants) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore the examiner would like to point out that the surfaces of Finlayson et al and Brainard et al do represent illuminants other than candidate illuminants because the candidate illuminants is a finite set and the surface has infinite number of points and therefore illuminant other than candidate illuminants are represented by the surface.

In summary the rejection does present a prima facie case of anticipation/obviousness in the rejections of claims 1-2 and 4-13.

Claim Rejections - 35 USC § 102

1. Claims 1-2, 4-7, and 9-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Finlayson et al (Finlayson, G. D. Hordley, S. D., Hubel, P. M. "Color by correlation: a simple, unifying framework for color constancy," IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 23, pp 1209-1221, 2001, cited by IDS).

Regarding claim 1, Finlayson et al teach a method for estimating an image illuminant, the method comprising:

forming an illuminant set comprising data describing a plurality of candidate illuminants (Figs. 1 and 2, left column of Page 1212, Page 1213);

analyzing an image in relation to said plurality of candidate illuminants to determine a plurality of match scores for said plurality of candidate illuminants (Figs. 1 and 2, left column of Page 1212, the correlation values are the match scores, or Pr(E/Cim) on left column of Page 1213 is regarded as the match scores);

fitting a surface to said plurality of match scores, said surface representing illuminant values other than said candidate illuminants (right column of Page 1213 and left column of Page 1214, the likelihood function is a surface that fit to said plurality of match scores); and

determining a point on said surface, said point corresponding to the data representing a likely illuminant for said image (left column of Page 1214, Equations (14-16), the quality defined by Equation (16) is the likely illuminant).

Regarding claim 2, Finlayson et al teach a method as described in claim 1 wherein said illuminant set is a design matrix for a predetermined set of illuminants (Figs. 1 and 2, the illuminant set ill1-ill8 can be regarded as a design matrix for a predetermined set of illuminants, Pages 1212 and 1213).

Regarding claim 4, Finlayson et al teach a method as described in claim 1 wherein said analyzing comprises forming an image histogram of image element color coordinates relative to color coordinate distributions under said candidate illuminants (Equation (4), Figs. 1 (b) is an histogram, Section 3.1 Page 1214).

Regarding claim 5, Finlayson et al teach a method as described in claim 1 wherein said fitting a surface comprises a best-fit least squares method (bottom of left column and top of right column, Page 1218, the method of RMSE is equivalent to a best-fit least square method, Equations (14)-(15) define a surface also Equations (10)-(13) define a surface with E as the variable).

Regarding claim 6, Finlayson et al teach a method as described in claim 1 wherein said fitting a surface comprises taking a weighted average of the match scores of the candidate illuminants (left column of 1214,Equation (14) is regarded as a weighted average of the match scores of the candidate illuminants with weight equals to 1 for all candidate illuminants, left column of Page 1215).

Regarding claim 7, Finlayson et al teach a method as described in claim 1 wherein said determining a point on said surface comprises locating surface extremum (left column of Page 1214).

Regarding claim 9, Finlayson et al teach a method as described in claim 1 wherein said determining a point on said surface comprises solving for the color coordinates of an extremum on said surface and, choosing the point of the extremum when the coordinates of said extremum are closer to reference illuminant coordinates than the closest candidate illuminant coordinates; or choosing the point of the closest candidate illuminant coordinates when the closest candidate

illuminant coordinates are closer to a reference illuminant than the extremum (left column of Page 1214, the coordinate of the extremum obtained from Eq. (16) corresponds to a reference illuminant coordinate and the extremum is closest to the reference illuminant than other candidate illuminants because it coincides with the reference illuminant, also the illuminants with error bar are returned and thus enabling choosing of the one with maximum likelihood.

Regarding claim 10, the term "candidate illuminants" in claim 1 are changed to "candidate color-balance corrections". A candidate illuminants corresponds to a candidate color-balance correction, which is the color constancy problem (abstract, 1st paragraph, right column of Page 1209, right column of Page 1218, Figs. 4 and 5, Table 1, of Finlayson et al), therefore Finlayson et al teach claim 10 as evidently described in the above passages.

Regarding claim 11, Finlayson et al teach a method for estimating an image illuminant, the method comprising:

forming a design matrix comprising the parameters of a plurality of candidate illuminants (Figs. 1 and 2, the illuminant set ill1-ill8 can be regarded as a design matrix for a predetermined set of illuminants, Pages 1212 and 1213) or the matrix of Pr under different illuminants can be regarded as the design matrix);

computing an image histogram comprising data relating the frequency of image element color values to color values found under said candidate illuminants (Fig. 1, the distribution is the histogram, also Page 1214, Equations (4), (16)-17) and (20));

determining match scores for said plurality of candidate illuminants (Figs. 1 and 2, Pages 1212 and 1213);

fitting a surface to said match scores, said surface representing illuminant parameter values other than said candidate illuminants (left column of Page 1214, equation (14));

solving for an extremum of said surface (left column of Page 1214, Equations (14)-(15) define a surface also Equations (10)-(13) define a surface with E as the variable); and

choosing the coordinates of said extremum as the parameters of an estimated image illuminant (left column of Page 1214, Equation (16)).

Claims 12 and 13 are the corresponding system and computer-readable medium claims of claim 1. Finlayson et al teach a system and a computer-readable medium (Section 4, to obtain results computer/system is used). Thus Finlayson et al teach claims 12-13 as evidently explained in the above-cited passages.

2. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Brainard et al (Brainard, D.H., Freeman, W.T., "Bayesian color constancy," J. Optical Soc. Am. A, vol. 14, pp 1393-1411, 1997, cited by IDS).

Regarding claim 1, Brainard et al teach a method for estimating an image illuminant, the method comprising:

forming an illuminant set comprising data describing a plurality of candidate illuminants (right column of Page 1393, Section 2.A, Fig. 3, Fig. 2, shows the candidate illuminant on the horizontal axes, Section 3.A);

analyzing an image in relation to said plurality of candidate illuminants to determine a plurality of match scores for said plurality of candidate illuminants (Section 2.B, Page 1396, probability is regarded as the match score, Section 3.A);

fitting a surface to said plurality of match scores, said surface representing illuminant values other than said candidate illuminants (Fig. 3, Section 2.B, Section 3.A, right column of Page 1399); and

determining a point on said surface, said point corresponding to the data representing a likely illuminant for said image (Page 1397, Section 3.A.3).

Regarding claim 5, Brainard et al teach a method as described in claim 1 wherein said fitting a surface comprises a best-fit least squares method (Equation (10) of Page 1397, Fig. 3, Appendix A).

Claim Rejections - 35 USC § 103

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Finlayson et al. Regarding claim 8, Finlayson et al teach a method as described in claim 7. However they do not explicitly teach wherein said method of locating said surface extremum comprises forming derivatives of said surface and setting them equal to zero to locate surface extremum. They do define a surface with variable E (Equations (10)-(15), E is the variable, Pages 1213-1214). The examiner would like to take official notice that there is teaching in calculus on locating a surface extremum by forming derivatives of the surface and setting them equal to zero to locate surface extremum. It is desirable to find the extremum of a surface depending on the application using known methods in mathematics. Therefore it would have been obvious to one of ordinary skill

in the art, at the time of invention, to use the method of calculus to locate a surface extremum by forming derivatives of the surface and setting them equal to zero in the method of Finlayson et al so that the extremum and therefore the best-fit illuminant can be found.

Allowable Subject Matter

4. Claim 14 is allowed. An examiner's statement of reasons for allowance is presented in the last office action and will not be repeated here.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yuzhen Ge whose telephone number is 571-272 7636. The examiner can normally be reached on 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Yuzhen Ge
Examiner
Art Unit 2624

WENPENG CHEN
PRIMARY EXAMINER

6/28/07